

CRITICAL PATH ROADMAP DISCIPLINE(S)	PRIMARY SPECIES / TYPE	GROUND EXPERIMENT TITLE	NASA OBPR - TASK BOOK Year Experiment Was Listed in Book							
			1995	1996	1997	1998	1999	2000	2001	2002
Advanced Life Support	Air	A Novel Method For Air Revitalization-CO2 Removal From Air By a Pulsating Device	1995	1996	1997	1998				
Advanced Life Support	Air	Adsorbed Carbon Dioxide and Water Interactions and Maintenance of Low CO2 Levels in Closed Environments	1995	1996	1997					
Advanced Life Support; Environmental Health	Air	Advanced SERS-Based Sensor for Monitoring Air Quality in Space Cabin Environments							2001	2002
Advanced Life Support; Radiation Effects; Clinical Capabilities; Environmental Health	Air	Advanced Technology Development - Biosensors						2000	2001	2002
Advanced Life Support; Environmental Health	Air	Advancement in Determining Hazardous Volatile Organic Compounds in Air	1995	1996	1997	1998				
Advanced Life Support; Environmental Health	Air	Air Quality Monitoring Sensor Using Long Pathlength FTIR		1996						
Advanced Life Support; Environmental Health	Air	Air Quality Monitoring Sensor Using Open Path Fourier Transform Infrared (FTIR)			1997					
Advanced Life Support	Air	Air Revitalization Systems Development and Testing				1998	1999	2000		
Advanced Life Support; Environmental Health	Air	Autonomous Gas Sensors Based on Tunable Diode Lasers							2001	2002
Advanced Life Support	Air	Biochemical Capture and Removal of Carbon Dioxide	1995	1996	1997	1998	1999			
Advanced Life Support	Air	Biofilter Study and Development - Composter/Biofilter					1999			
Advanced Life Support	Air	Biofilter Study and Development - Ersatz and Ethylene					1999			
Advanced Life Support	Air	CO2 Compressor						2000		
Advanced Life Support; Environmental Health	Air	Compact, Rapid Response Optical Air Quality Monitor		1996	1997	1998				
Advanced Life Support	Air	Contaminants in ALS						2000		
Advanced Life Support	Air	Cryogenic Portable CO2 Removal System; Cryogenic Portable CO2 Removal System					1999	2000	2001	2002
Advanced Life Support	Air	Cryogenic PLSS Design Study			1997	1998				
Advanced Life Support; Environmental Health	Air	Development of a Tunable Diode Laser/Cavity Ring- Down Sensor for Monitoring Spacecraft Air Quality						2000	2001	2002
Advanced Life Support	Air	Development of Biological Trace Contaminant Control Technology: Biofiltration of Ammonia, Ethylene and an Ersatz ISS Atmosphere							2001	
Advanced Life Support	Air	Development of Chambers for Monitoring Canopy Gas Exchange					1999	2000	2001	
Advanced Life Support; Clinical Capabilities; Environmental Health	Air	Electronic Nose				1998	1999			
Advanced Life Support; Clinical Capabilities; Environmental Health	Air	Electronic Nose Re-Flight						2000		
Advanced Life Support	Air	Enhanced Molecular Sieve CO2 Removal Evaluation	1995	1996	1997	1998				
Advanced Life Support	Air	Enzyme-Based Carbon Dioxide Capture and Removal						2000		
Advanced Life Support	Air	Gaseous Ammonia Removal in Biofilters				1998				
Advanced Life Support	Air	High Capacity Thermally Regenerated Supported Amines for CO2 Capture								2002
Advanced Life Support; Environmental Health	Air	Identification and Quantification of Volatile Organic Emissions from Living Tomato and Soybean Plants, Solid Waste Composter and Food; Identification and Quantification of Volatile Organic Emissions from Living Plants, Solid Waste Composter and Food					1999	2000	2001	
Advanced Life Support; Environmental Health	Air	Identification and Quantification of Volatile Organic Emissions from Healthy and Stressed Tomato Plants				1998				
Advanced Life Support; Environmental Health	Air	In-site, Remote Chemical Sensors Based on Thin Magnetic Films; In-situ, Remote Chemical Sensors Based on Thin Magnetic Films			1997	1998	1999	2000		
Advanced Life Support	Air	Investigation of Ambient Pressure, Non-Thermal Diffuse Plasmas for Destruction of Airborne Environmental Contaminants in ALS					1999	2000		
Advanced Life Support	Air	Investigation of Large Volume, Ambient Pressure, Non-Thermal Diffuse Plasmas for Destruction of Airborne Environmental Contaminants in Advanced Life Support Systems							2001	2002
Advanced Life Support; Environmental Health	Air	Laser Based Absorption Sensors for Trace Gas Monitoring in a Spacecraft Environment				1998	1999	2000	2001	2002
Advanced Life Support	Air	Low pCO2 Air-Polarized CO2 Concentrator Development (Phase I of Space Station Experiment Development Study)	1995	1996						
Advanced Life Support	Air	Membrane Based Carbon Dioxide Removal for Spacesuits				1998				
Advanced Life Support	Air	Membrane Based Selective CO2 Removal				1998				
Advanced Life Support; Environmental Health	Air	Mesosopic Instrumentation Miniature FTIR for Environmental Monitoring and Chemical Analysis				1998	1999	2000	2001	2002
Advanced Life Support; Environmental Health	Air	Microfabricated Optical Biosensor Arrays for Air Quality Monitoring							2001	2002
Advanced Life Support; Environmental Health	Air	Micro-machined Drift Tubes for Ion Mobility Spectrometry: Studies Toward a Hand-Held Volatile Organic Analyzer for Mars Missions							2001	2002
Advanced Life Support; Environmental Health	Air	Miniature Quadrupole Mass Spectrometer					1999	2000		
Advanced Life Support; Environmental Health	Air	Miniature Quadrupole Array Mass (QMSA) Spectrometer Flight Instrument							2001	
Advanced Life Support	Air	Modeling of Air Contaminant Removal in Biofilters				1998				
Advanced Life Support; Environmental Health	Air	Modeling, Monitoring and Fault Diagnosis of Spacecraft Air Contaminants	1995	1996	1997	1998				
Advanced Life Support; Environmental Health	Air	Multigas Sensor for Advanced Life Support	1995	1996	1997					
Advanced Life Support; Environmental Health	Air	New Technology for Optically-Based Multifunctioned Chemical Sensors			1997	1998				
Advanced Life Support; Environmental Health	Air	Novel Laser-Based Gas Sensors for Trace Gas Detection in a Spacecraft Habitat						2000	2001	
Advanced Life Support; Environmental Health	Air	Pilot Study: Acoustic attenuation as a realtime gaseous process control monitor							2001	2002
Advanced Life Support	Air	Regenerable Incinerator Exhaust Purification and Trace Contaminant Control System				1998	1999	2000	2001	2002
Advanced Life Support	Air	Removal of Trace Concentrations of Ethylene from Air by Biofiltration: Preliminary Results				1998				
Advanced Life Support; Environmental Health	Air	Second Generation Electronic Nose							2001	2002
Advanced Life Support	Air	Solid State CO2 Compressor							2001	

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			1995	1996	1997	1998	1999	2000	2001	2002
Advanced Life Support	Air	Testing an Algae-Based Air-Regeneration System Designed For Use in a Weightless Environment	1995	1996	1997	1998				
Advanced Life Support	Air	The Development of the Vapor Phase Catalytic Ammonia Removal Technology							2001	2002
Advanced Life Support	Air	Tunable Diode Lasers				1998	1999	2000		
Advanced Life Support	Air	Zirconia Electrolysis Cells for Oxygen Generation from Carbon Dioxide				1998				
Advanced Life Support; Environmental Health	Air	Micro-mass Spectrometer for Containment Gas Monitoring		1996	1997	1998	1999			
Advanced Life Support; Environmental Health; Food & Nutrition	Air	NSCORT: Bioregenerative Life Support		1996	1997	1998				
Advanced Life Support; Neurovestibular Adaptation	Animal	The Evolution of Gravity Reception in the Metazoa							2001	2002
Advanced Life Support; Environmental Health	Microbe	Development of Sample Collection and Preparation Technology for Gene-Based Microbial Monitoring of Recycled Water and Air				1998				
Advanced Life Support; Environmental Health	Microbe	DNA Microchip-Based Microbial Monitoring					1999	2000	2001	2002
Advanced Life Support	Microbe	Evaluation of Constructed Microbial Communities as Inocula for Biological Life Support Systems				1998	1999	2000		
Advanced Life Support; Environmental Health	Microbe	ISS Bio-contamination Project: Optical Methods for Detection and Sterilization of Pathogens in Water, Air, and Food Supplies							2001	2002
Advanced Life Support; Environmental Health	Microbe	Microbial Detection							2001	2002
Advanced Life Support	Microbe	Microbial Ecology					1999	2000		
Advanced Life Support	Microbe	Microbial Monitoring Based on Quantitative PCR		1996	1997	1998	1999			
Advanced Life Support; Immunology, Infection & Hematology; Environmental Health	Microbe	Microorganisms in the Spacecraft Environment							2001	2002
Advanced Life Support; Environmental Health	Microbe	Monitoring of Physiological Analytes/ Microbial Contamination in Water								2002
Advanced Life Support	Microbe	Monitoring Spatial and Temporal Changes in Pathogen Invasibility of Microbial Communities in Hydroponically Grown Wheat						2000	2001	
Advanced Life Support	Microbe	Plasma Chemical Approaches to the Development of Biofilm-Resistant Surfaces	1995	1996	1997	1998				
Advanced Life Support; Environmental Health	Microbe	Rapid Bacterial Testing for Spacecraft Water; Rapid Bacterial Testing of Spacecraft Water		1996	1997	1998	1999	2000	2001	2002
Advanced Life Support	Microbe	The Effects of Microgravity on the Ecology of Biofilm Bacteria							2001	2002
Advanced Life Support	Microbe	UV Microbial Detection and Sterilization					1999	2000		
Advanced Life Support; Human Behavior & Performance; Neurovestibular Adaptation	Other	Adaptation in Artificial Gravity Environments; Adaptation in Artificial Gravity	1995	1996	1997	1998	1999	2000	2001	2002
Advanced Life Support	Other	Advanced Control System Development for Integration of Advanced Life Support Systems								2002
Advanced Life Support	Other	Advanced Life Support Controls							2001	
Advanced Life Support	Other	Advanced Life Support Power Reduction					1999	2000	2001	2002
Advanced Life Support	Other	Advanced Life Support Program Thermal Control Element							2001	2002
Advanced Life Support	Other	Advanced Life Support Systems Integration Modeling and Analysis							2001	2002
Advanced Life Support	Other	Advanced Life Support Systems Integration Test Bed (a.k.a. BIO-Plex)				1998	1999	2000		
Advanced Life Support	Other	Advanced Life Support Systems Modeling							2001	2002
Advanced Life Support	Other	Advanced System Modeling and Control of Bioregenerative Life Support					1999	2000	2001	2002
Advanced Life Support	Other	Advanced Trace Contaminant Control Systems Development							2001	2002
Advanced Life Support	Other	Advanced Waste Management Technology Evaluation	1995	1996						
Advanced Life Support	Other	AI Software Development for Advanced Life Support	1995	1996	1997	1998				
Advanced Life Support	Other	ALS Power Reduction						2000		
Advanced Life Support	Other	Anarobic Composting for Stabilization of Solid Wastes During Space Missions								2002
Advanced Life Support	Other	Biological Treatment of Solid Waste: Composting, Biofiltration of Compost Offgas, and Nutrient Recovery from Compost						2000	2001	
Advanced Life Support	Other	Biomimetic Detection Schemes Based on a Microcentrifuge Platform						2000	2001	2002
Advanced Life Support	Other	Biomimetic Detection Schemes on a Microcentrifuge Platform (LabCD)					1999			
Advanced Life Support	Other	Biomimetic Self-Assembly of Hardened (Nacre-Like) Composite Coatings							2001	2002
Advanced Life Support	Other	Biomimetic Self-Assembly of Hardened (Nacre-like) Nanocomposite Coatings for TransHab					1999	2000		
Advanced Life Support	Other	Bioregenerative Planetary Life Support Systems Test Complex							2001	
Advanced Life Support	Other	Breadboard Tests / Integrated Test Support					1999			
Advanced Life Support	Other	Controls & Faults						2000		
Advanced Life Support	Other	Cytoplasmic/Golgi interactions in the nanofabrication of biomineral composites - a genetic approach using coccolithophores							2001	2002
Advanced Life Support	Other	Development of 3T Control System for Advanced Life Support Applications				1998				
Advanced Life Support	Other	Development of 3T Control System for Advanced Life Support Applications						2000	2001	
Advanced Life Support	Other	Development of Advanced Life Support Systems Maximally Reliant on Biological Systems				1998				
Advanced Life Support	Other	Development of an Integrated System for Processing and Stabilization of Human Solid Wastes and Inedible Plant Biomass for Advanced Life Support Systems					1999	2000	2001	2002
Advanced Life Support; Clinical Capabilities; Environmental Health	Other	Environmental Biomedical Research Data Center; Environmental Biomedical Stress Data Center	1995	1996	1997	1998	1999			
Advanced Life Support	Other	Environmental Systems Commercial Space Technology Center (ES CSTC)							2001	
Advanced Life Support	Other	Global Modeling of an Integrated Life Support System						2000	2001	
Advanced Life Support	Other	Global Optimization of a Complex Integrated System for Bioregenerative Life Support				1998	1999			
Advanced Life Support	Other	Harnessing Solar Irradiance for Space Life Support; Harnessing Solar Irradiance for Life Support			1997	1998	1999			
Advanced Life Support	Other	Heat Pump Technology Development				1998	1999	2000		
Advanced Life Support	Other	Hybrid Solar and Artificial Lighting for Space Life Support					1999	2000	2001	
Advanced Life Support	Other	Integrated Simulation of BIO-Plex Work Practices and Systems							2001	
Advanced Life Support	Other	Investigation of Biological Approaches to Solid Waste Management and Resource Recycling						2000		
Advanced Life Support	Other	ISRU Technologies for Mars Life Support					1999	2000	2001	2002
Advanced Life Support	Other	Lightweight Radiator Technology Development				1998				
Advanced Life Support	Other	Mars 2005/Immunoassay Life Detection Instrument (MILDI); Mars Immunoassay Life Detection Instrument (MILDI)						2000	2001	
Advanced Life Support	Other	Mars Organic Detector (MOD): Looking for Clues for Life and Evaluating the Water Inventory for In Situ Resource Utilization						2000		
Advanced Life Support	Other	Mars Radiator Characterization Experiment								2002

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Advanced Life Support	Other	Membrane Based Thermal Control Development			1997	1998				
Advanced Life Support	Other	Microgravity and Hypogravity Compatible Methods for Resource Recovery from Solid Wastes by Magnetically Assisted Gasification							2001	2002
Advanced Life Support	Other	Microgravity and Hypogravity Compatible Methods for Resource Recovery from Solid Wastes by Magnetically Assisted Gasification (MAG)						2000		
Advanced Life Support; Clinical Capabilities; Environmental Health	Other	Multianalyte Biosensor with Chips for Human and Environmental Monitoring						2000	2001	2002
Advanced Life Support	Other	Numerical Assessment of Life Support Options for Long Duration Space Missions; Numerical Assessments of Life Support Options for Long Duration Space Missions				1998	1999	2000	2001	
Advanced Life Support	Other	Reactive Carbon from Life Support Waste for Flue Gas Cleanup					1999	2000	2001	
Advanced Life Support	Other	Resource Recovery (Solid Waste Processing)					1999	2000	2001	2002
Advanced Life Support	Other	Size Reduction of Solid Wastes as a Pre-processing Stage for Biological, Physical, and Chemical Processes						2000	2001	
Advanced Life Support	Other	Systems Impacts of Waste Processing							2001	2002
Advanced Life Support	Other	Systems Modeling, Analysis and Control - Planning and Scheduling				1998				
Advanced Life Support	Other	The Development of a Solid Waste Treatment Technology for the Near Term Human Exploration of Mars						2000	2001	2002
Advanced Life Support	Other	Thermal Control Research and Tech Development						2000		
Advanced Life Support	Other	Top Level Modeling of an Advanced Life Support System Using an Object Oriented Approach					1999	2000	2001	
Advanced Life Support	Other	Waste Management and Resource Recycling					1999	N/A	2001	2002
Advanced Life Support	Other	Waste Reclamation Process Development for Advanced Life Support				1998	1999	2000	2001	2002
Advanced Life Support	Plant	ALS Resource Recovery Research and Tech Development						2000		
Advanced Life Support	Plant	An Early Fault Detection System for Hydroponic Crop Production: Computer Simulation of Water and Nutrient Uptake						2000	2001	2002
Advanced Life Support	Plant	An Investigation of Composting Plant and Human Wastes in a Controlled Ecological Life Support System (CELSS)			1997	1998				
Advanced Life Support	Plant	An Investigation of Composting Plant and Human Wastes in an Advanced Life Support Systems (ALSS)				1998				
Advanced Life Support	Plant	Analysis of a Novel Sensory Mechanism in Root Phototropism							2001	2002
Advanced Life Support	Plant	Analysis of Stimulus-Response Systems in Root of Arabidopsis				1998	1999			
Advanced Life Support	Plant	Analysis of the Gravisensing System in Chara						2000	2001	2002
Advanced Life Support	Plant	Analysis of the Interaction of Environmental Signal Transduction Pathways Using Gravi-Compensation						2000	2001	2002
Advanced Life Support	Plant	AOTF Spectrometer System for the Remote Detection of Plant Canopy Nutrient Stresses in a NASA CELSS			1997	1998				
Advanced Life Support	Plant	Applications of plant bioengineering for advanced life support systems								2002
Advanced Life Support	Plant	Automation of Plant Chambers					1999	2000		
Advanced Life Support	Plant	Biodegradation and Nutrient Recovery of Inedible Plant Biomass for Advanced Life Support Systems						2000		
Advanced Life Support	Plant	Biodegradation of Inedible Plant Crop Biomass and Nutrient Recovery							2001	
Advanced Life Support	Plant	Biological Treatment of Plant Waste					1999			
Advanced Life Support	Plant	Biologically Mediated Solids Reduction and Nutrient Recovery from Inedible Tomato Plant Material				1998				
Advanced Life Support	Plant	Biomass for Advanced Life Support Systems					1999			
Advanced Life Support	Plant	Biomass Production							2001	2002
Advanced Life Support	Plant	Biomass Production - Plant Cultivation, Solid Substrates, Large-Scale Integrated Testing						2000		
Advanced Life Support	Plant	Biomechanics of Arabidopsis thaliana Wavy Root Development						2000	2001	2002
Advanced Life Support	Plant	Blue-Light Signal Transduction in Arabidopsis Seedlings. A Multidisciplinary Study				1998	1999			
Advanced Life Support	Plant	Calcium Messenger System in Gravitropic Response in Plants	1995	1996	1997	1998	1999	2000	2001	2002
Advanced Life Support	Plant	Calcium-Mediated Mechano-Sensory Signal Transduction in Plants				1998	1999			
Advanced Life Support	Plant	Candidate Crop Evaluation for Advanced Life Support and Gravitational Biology and Ecology				1998	1999			
Advanced Life Support	Plant	Cellular Bases of Light Regulated Gravity Responses	1995	1996	1997	1998	1999	2000		
Advanced Life Support	Plant	Cellular bases of light regulated gravity responses							2001	2002
Advanced Life Support	Plant	Cellular Bases of Light-stimulated Gravitropism	1995							
Advanced Life Support	Plant	Cellular Specificity in Arabidopsis Root Gravitropism	1995	1996	1997	1998				
Advanced Life Support	Plant	CELSS Crop Simulations for Systems Engineering and Productivity Optimization	1995	1996	1997	1998				
Advanced Life Support	Plant	Changes in Gene Expression During Gravitstimulation						2000		
Advanced Life Support	Plant	Changing Calcium Homeostasis in Transgenic Plants: A Reverse Genetics Approach						2000		
Advanced Life Support	Plant	Control Systems Integration in Closed Ecological Systems Using Denitrification as a Model			1997	1998	1999	2000	2001	
Advanced Life Support; Food & Nutrition	Plant	Cost Optimization of Food Preparation for Lunar and Planetary CELSS Stations			1997	1998	1999	2000		
Advanced Life Support	Plant	Coupling Sensing to Crop Models for Closed-Loop Analysis of Plant Production in Advanced Life Systems: I. Using Machine Vision Observations to Detect Deviations from Present Temperature Set-Points				1998				
Advanced Life Support	Plant	Crop Modeling for Multiple Crop Production and Control for Advanced Life Support Systems				1998	1999	2000	2001	
Advanced Life Support	Plant	Crop Optimization and Failure Analysis for Advanced Life Support						2000		
Advanced Life Support	Plant	Crop Optimization and Failure Analysis Using CO2 Gas Exchange							2001	
Advanced Life Support	Plant	Crop Production and Environmental Systems					1999	2000	2001	2002
Advanced Life Support	Plant	Crop Production Optimization Using CO2 Gas-exchange	1995	1996	1997	1998	1999			
Advanced Life Support; Food & Nutrition	Plant	Designing an Advanced Food Processing System for Long Duration Space Travel				1998				
Advanced Life Support	Plant	Determining the Complex Organizational Nature of Phenolic Radical-Radical Coupling Networks in Vascular Plants: Evolutionary and Gravitational Significance								2002
Advanced Life Support	Plant	Development of Decision Support, Teaching/Training Tools for Biomass Production Systems				1998				
Advanced Life Support; Food & Nutrition	Plant	Development of Extrusion Processes and Food Products to be Used in ALSS; Development of Extrusion Processes and Food Products to be Used in an ALSS				1998	1999	2000	2001	
Advanced Life Support	Plant	Differential Gene Expression in Germinating Spores of Ceratopteris richardii During the Period of Responsiveness to Gravity			1997	1998				
Advanced Life Support	Plant	Early Gravitropic Events in Roots of Arabidopsis							2001	2002
Advanced Life Support	Plant	Early Gravitropic Events in Roots of Arabidopsis: Ca2+ and H+ Fluxes in the Columella Cells					1999	2000		
Advanced Life Support	Plant	Efficacy of Plant Residue Degradation Products on Nutrient Bioavailability in Regenerative Life Support Systems							2001	

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Advanced Life Support	Plant	Enhanced Labeling Techniques to Study the Cytoskeleton During Root Growth and Gravitropism							2001	2002
Advanced Life Support	Plant	Environmental and Mechanical Control of Tomato Plant Height for Crop Production in Space				1998				
Advanced Life Support	Plant	Ethylene synthesis and Sensitivity in Crop Plants								2002
Advanced Life Support	Plant	Expression and Isolation of ADP-Glucose Pyrophosphorylase -- A Key Enzyme for Starch Biosynthesis in Plants;				1998	1999		2001	
		ADP-glucose Pyrophosphorylase---A Key Enzyme for Starch Biosynthesis in Plants								
Advanced Life Support; Food & Nutrition	Plant	Extruder Design and Miniaturization; Extrusion Design and Miniaturization					1999	N/A	2001	
Advanced Life Support	Plant	Flow and Distribution of Fluid Phases through Porous Plant Growth Media in Microgravity								2002
Advanced Life Support	Plant	Food and Crop Systems;							2001	2002
		Food and Crop Systems for Advanced Life Support								
Advanced Life Support; Food & Nutrition	Plant	Food Processing Research and Technology Development						2000	2001	2002
Advanced Life Support; Food & Nutrition	Plant	Food Technology and Utilization					1999	2000		
Advanced Life Support; Food & Nutrition	Plant	Food Technology Utilization							2001	2002
Advanced Life Support	Plant	Fucus as a Model System to Study the Role of Auxin Transport and the Actin Cytoskeleton in Gravity Response				1998	1999	2000	2001	2002
Advanced Life Support; Food & Nutrition	Plant	Genetic and Environmental Influences on the Nutritive Value of Spinach, Spinacia oleracea, for Humans						2000		
Advanced Life Support	Plant	Germplasm Development and Improvement (Dr. Hill)							2001	2002
Advanced Life Support	Plant	Germplasm Development and Improvements (DR. Bonsai)					1999	2000		
Advanced Life Support	Plant	Graviperception in Starch Deficient Plants in Biorack						2000		
Advanced Life Support	Plant	Gravitropic Signal Transduction in the lazy-2 Tomato Mutant	1995	1996	1997	1998	1999			
Advanced Life Support	Plant	Gravitropism in Chara Rhizoids					1999	2000	2001	2002
Advanced Life Support	Plant	Gravity-Induced Polarity of Transport in Plants	1995							
Advanced Life Support	Plant	In Situ Resource Utilization of Martian Regolith with Plant Compost from Crop Production					1999	2000		
Advanced Life Support	Plant	Integrated Analysis of Columella Cell Structure and Function			1997	1998	1999	2000	2001	2002
Advanced Life Support	Plant	Integrated Modeling, Optimization, and Cultural Components of a Biomass Production System as and Educational Application Utilizing Hypermedia Technology					1999			
Advanced Life Support	Plant	Integration of Plant Responses to Mechanical, Thermal, Electrical, and Chemical Signals				1998	1999	2000	2001	
Advanced Life Support	Plant	Interaction of Light and Ethylene in Stem Gravitropism	1995	1996						
Advanced Life Support	Plant	Interactions Between Gravity and Light in Determining Plant Form: Analysis using the lazy-2 Mutant of Tomato					1999	2000	2001	2002
Advanced Life Support	Plant	Kinetics of Nitrification by Isotope Dilution in Growth of Wheat Using Zeoponics							2000	
Advanced Life Support	Plant	Lignification: A New Paradigm				1998	1999	2000	2001	2002
Advanced Life Support	Plant	Machine Vision Monitoring of Plant Growth and Motion				1998				
Advanced Life Support	Plant	Magnetophoretic Induction of Root Curvature	1995	1996						
Advanced Life Support	Plant	Mechanism of Auxin Action in Root Growth/Gravitropism	1995	1996	1997	1998				
Advanced Life Support	Plant	Mechanisms of Differential Growth During Stem Gravitropism	1995							
Advanced Life Support	Plant	Mechanosensing in Arabidopsis. A Genetic Analysis Based on Mechanoinducible Luminescence				1998	1999			
Advanced Life Support	Plant	Mechanotransduction and the Cortical Cytoskeleton: What is the relationship?	1995	1996						
Advanced Life Support	Plant	Mechanotransduction Through the Cytoskeleton			1997	1998	1999	2000		
Advanced Life Support	Plant	Microgravity Effects on Early Reproductive Development in Plants	1995	1996	1997	1998				
Advanced Life Support	Plant	Microgravity Effects on Seed Development and Maturation					1999	2000	2001	2002
Advanced Life Support	Plant	Molecular and Biochemical Analysis of CRT1, a Protein Involved in Ethylene Signal Transduction				1998	1999			
Advanced Life Support	Plant	Molecular and Developmental Responses of Plants to Mechanical Stimuli; Rice NSCORT in Gravitational Biology: Molecular and Developmental Responses of Plants to Mechanical Stimuli				1998	1999	2000		2002
Advanced Life Support	Plant	Molecular Cloning and Characterization of the AGR1 Gene of Arabidopsis thaliana					1999	2000	2001	2002
Advanced Life Support	Plant	Molecular Cloning of the Arabidopsis thaliana AGR1 Locus		1996	1997	1998	1999			
Advanced Life Support	Plant	Molecular Control of Cell Growth During Gravity Responses of Maize Seedlings					1999	2000	2001	2002
Advanced Life Support	Plant	Molecular Genetic Analysis of Gravitropism in Arabidopsis				1998	1999			
Advanced Life Support	Plant	Molecular Genetics of Root Thigmoresponsiveness in Arabidopsis thaliana	1995	1996	1997	1998	1999	2000	2001	2002
Advanced Life Support; Food & Nutrition	Plant	NASA Food Technology Commercial Space Center							2001	2002
Advanced Life Support	Plant	NSCORT - Calcium, Signaling and Gravity: An Integrated Molecular, Cellular and Physiological Approach to Plant Gravitational Biology		1996	1997	1998	N/A	2000	2001	2002
Advanced Life Support	Plant	NSCORT - Project II. Isolation of a Novel Class of Arabidopsis Mutants with Impaired Transduction of the Gravity Signal							2001	2002
Advanced Life Support	Plant	NSCORT Project I. Changing Calcium Homeostasis in Transgenic Plants: A Reverse Genetics Approach							2001	2002
Advanced Life Support	Plant	NSCORT Project III. Changes in Plant Gene Expression During and After gravistimulation							2001	2002
Advanced Life Support	Plant	NSCORT Project IV. Signal Transduction Pathways and Early Responses to Gravistimulation in Plant							2001	2002
Advanced Life Support	Plant	NSCORT Project V. Effects of Gravity on Plant Metabolism							2001	2002
Advanced Life Support; Food & Nutrition	Plant	NSCORT: BIOREGENERATIVE LIFE SUPPORT - Biomass Productivity and Sustainability of Bioregenerative Life Support Systems	1995	1996	1997					
Advanced Life Support	Plant	NSCORT: NASA/NSF Joint Program in Plant Biology	1995	1996	1997	1998				
Advanced Life Support	Plant	Nutrient Delivery System for Root Crops with the Salad Machine					1999			
Advanced Life Support	Plant	Nutrient Delivery Systems for Salad Machine Crops						2000	2001	
Advanced Life Support	Plant	Optimization of Root Zone Substrates for Reduced Gravity Experiments							2001	
Advanced Life Support	Plant	Performance of Salad-Type Plants Grown Under Narrow Spectrum Light-Emitting Diodes (LEDs) in a Controlled Environment					1999	2000	2001	2002
Advanced Life Support	Plant	Phosphoinositide Signaling and Plant Gravitropism: A Transgenic Approach							2001	2002
Advanced Life Support	Plant	Plant Cultivation					1999			
Advanced Life Support	Plant	Plant Gravitropisms and the Role of Expansins			1997	1998	1999			
Advanced Life Support	Plant	Plant Growth and Metabolism at Sub-Ambient Atmospheric Pressures;					1999	2000	2001	2002
		Plant Growth and Metabolism at Sub-Ambient Atmospheric Pressures								
Advanced Life Support	Plant	Plant Growth Chamber Experiments for the Crop Modeling Objectives of the NJ-NSCORT							2001	
Advanced Life Support	Plant	Plant Growth Chamber Experiments with Soybean and White Potato					1999	2000		
Advanced Life Support	Plant	Plant Lighting Systems				1998	1999			

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Advanced Life Support	Plant	Plant Nutrient Delivery				1998	1999			
Advanced Life Support	Plant	Plant Research in the EDU and Water Reuse/Recycling							2001	2002
Advanced Life Support	Plant	Plasmadesmata and the Control of Gravitropism	1995	1996	1997	1998				
Advanced Life Support; Food & Nutrition	Plant	Prediction Of Processing Parameters Of Wheat-Based Food Products With Varying Compositions								2002
Advanced Life Support; Food & Nutrition	Plant	Quality Evaluation of ALS Hydropoinc Tomatoes for their Suitability for Fresh Consumption and Further Processing; Quality Evaluation of ALS Hydroponic Tomatoes for Their Suitability for Fresh Consumption and Processing				1998	1999	2000	2001	
Advanced Life Support	Plant	Re-Evaluation of the Role of Starch in Gravitropic Sensing	1995	1996	1997	1998				
Advanced Life Support	Plant	Regenerating Protoplast as a Single-Cell Model System for Studying the Gravitropism in Plants			1997	1998	1999	2000		
Advanced Life Support	Plant	Regulation of ADP- Glucose Pyrophosphorylase Subunit Expression -A Key Enzyme for Starch Biosynthesis in Plants						2000		
Advanced Life Support	Plant	Regulation of Auxin Transport by Phosphorylation and Flavonoids during Gravitropism in Arabidopsis							2001	2002
Advanced Life Support	Plant	Regulation of Growth in the Distal Elongation Zone of Maize Roots				1998	1999			
Advanced Life Support	Plant	RNAi Analysis of Gravity Signal Transduction in Ceratopteris richardii							2001	2002
Advanced Life Support	Plant	Self Reporting Space Crops: Edible Biosensors							2001	2002
Advanced Life Support	Plant	Self-Generating Bending Moments in Root Gravitropism	1995	1996	1997	1998				
Advanced Life Support	Plant	Space Experiment on Tuber Development & Starch Accumulation for CELSS	1995	1996						
Advanced Life Support	Plant	The Efficacy of Plant Residue Degradation Products on Nutrient Bioavailability in Regenerative Life Support Systems						2000		
Advanced Life Support	Plant	The Evolutionary Origin and Deployment of the Hox and ParaHox Genes in the Metazoa					1999	2000	2001	2002
Advanced Life Support	Plant	The Regenerating Protoplast as a Single-Cell Model System for Studying Gravitropism in Plants							2001	2002
Advanced Life Support	Plant	The Regulation of Growth in the Distal Elongation Zone of Maize Roots						2000	2001	
Advanced Life Support	Plant	The Role of Actin Cytoskeleton in Auxin Transport and Gravitropism	1995	1996	1997					
Advanced Life Support	Plant	The Role of Electrical Events in Controlling Differential Elongation and Gravitropism in the DEZ			1997	1998	1999	2000		
Advanced Life Support	Plant	The Role of Integrins in the Transduction of Gravitropism			1997	1998				
Advanced Life Support	Plant	The Use of Arabidopsis Transposon Mutants in the Study of Gravitropism; Use of Arabidopsis Transposon Mutants in the Study of Gravitropism			1997	1998	1999	2000	2001	
Advanced Life Support	Plant	Top Level Modeling of the Biomass Production Component of an Advanced Life Support System Using an Object Oriented Approach				1998				
Advanced Life Support	Plant	Transduction of the Gravity Signal in Roots of Corn	1995	1996	1997	1998				
Advanced Life Support	Plant	Use of Induced-Fluorescence Imaging and Green Fluorescent Proteins to Monitor the Health of Plants under Simulated Martian Environments								2002
Advanced Life Support	Plant	Using CO2 Gas Exchange to Determine the Factors Controlling Respiration and Carbon use Efficiency in Crop Plants						2000	2001	2002
Advanced Life Support	Plant	Zeoionic Plant Growth Substrates for Space Applications				1998	1999	2000	2001	2002
Advanced Life Support	Water	Advanced Water Recovery Research and Tech Development						2000		
Advanced Life Support	Water	Advanced Water Recovery Systems; Advanced Water Recovery Systems Development				1998	1999		2001	2002
Advanced Life Support	Water	Biological Wastewater Processor Experiment Definition				1998	1999	2000		
Advanced Life Support	Water	Bioregenerative Research and Technology Development							2001	2002
Advanced Life Support; Environmental Health	Water	Capillary Electrophoretic Methods for Monitoring Spacecraft Water Quality	1995	1996	1997	1998				
Advanced Life Support	Water	Characterization of Eubacteria in the Biological Water Processor (BWP)-Nitrogen Cycling							2001	2002
Advanced Life Support	Water	Enhanced Oxidation Catalysts for Water Reclamation			1997	1998	1999			
Advanced Life Support	Water	Grey Water Treatment in Immobilized Cell Packed Bed Bioreactors				1998	1999			
Advanced Life Support; Environmental Health	Water	High Performance Polymers for Cation Separation and Detection in Aqueous Environments			1997	1998				
Advanced Life Support	Water	Integrated Water Chemical Analyzer				1998	1999			
Advanced Life Support; Environmental Health	Water	Lab-on-a-Chip Technologies for Advanced Environmental Monitoring and Control (AEMC)							2001	2002
Advanced Life Support	Water	Magnetically Agitated Photocatalytic Reactor for Water Recovery								2002
Advanced Life Support; Environmental Health	Water	Microgravity Compatible Reagentless Instrumentation for Detection of Dissolved Organic Acids and Alcohols in Potable Water					1999	2000	2001	2002
Advanced Life Support; Environmental Health	Water	Micro-Scale Fluidic Technologies for AEMC					1999	2000		
Advanced Life Support; Environmental Health	Water	Miniaturized Liquid Chromatography		1996	1997	1998	1999	2000		
Advanced Life Support	Water	Monitoring Physiological Variables with Membrane Probes	1995	1996	1997					
Advanced Life Support; Environmental Health	Water	Multisensor Array for Monitoring Water Quality on Spacecraft and Planetary Habitats						2000	2001	2002
Advanced Life Support; Environmental Health	Water	Rapid, Specific Chemical Sensors and Test Kit Methodologies for Spacecraft Water Quality Monitoring							2001	2002
Advanced Life Support; Environmental Health	Water	Remediation of Biofilms Formed by Bacteria Isolated from Spacecraft Water Systems		1996	1997	1998				
Advanced Life Support	Water	Rotating Membrane Water Purification for Long-Term Human Presence in Space								2002
Advanced Life Support; Environmental Health	Water	Surface Control of Electrochemical Sensors for Water Reclamation							2001	2002
Advanced Life Support	Water	VPCAR Water Processor						2000		
Advanced Life Support	Water	Water Purification in Microgravity by Freeze Separation	1995	1996						
Advanced Life Support; Environmental Health	Water	A New Reagentless Carbon Analyzer for Water Quality Monitoring in Space					1999	2000	2001	
Advanced Life Support	Water / Air	Effectiveness of a Photocatalytic Reactor System for Water Recovery and Air Revitalization in Long-Duration Human Spaceflight								2002